



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(54) Title:</b> LOAD-CHANGER FOR VEHICLES		
<b>(57) Abstract</b>  <p>A load-changer for vehicles includes a rotatable cog-wheel (12) that is mounted on the edge of a load-carrier (2) included in the vehicle, and arranged to engage a cog-track on the under side of the load object in question, means being arranged to dampen the tendency of the load object to swing around the cog-wheel in connection with that the centre of gravity of the load object passes the cog-wheel. This damping means includes at least one arm, swingably mounted on the load-carrier, to which arm a spring or piston-cylinder mechanism (19) is connected, that, in connection with the loading of the load object onto the load-carrier (2), keeps the arm inclined upwards from the area of the cog-wheel. By this fact the arm can be brought into engagement with a guide extending along the load object, said mechanism initially counteracting the weight of the load object after that the centre of gravity of the load object has passed the cog-wheel, and then allowing the arm to be successively swung down, and thereby also the load object, into a plane essentially parallel to the load carrier.</p>		

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LOAD-CHANGER FOR VEHICLESTechnical field of the invention

This invention relates to a load-changer for vehicles comprising a rotatable cog- or tooth-wheel mounted on the edge of a load-carrier included in the vehicle and being arranged to engage a track provided with cogs or holes, said track being arranged on the under side of a load-object in question for instance a house, means being provided to dampen the tendency of the load-object to swing around the cog-wheel in connection with that the centre of gravity of the load-object passes the cog-wheel. Load-changers of this kind, that in practice are often used for loading houses for recreation purposes, are advantageous in so far as they do not need any space between the drivers cabin and the house or load-object loaded onto the load-carrier. In other words, they permit a maximum utilization of the load-carrying capacity of the load-carrier.

State of the art

A load-carrier of the type generally described above has previously been disclosed in the US Patent Specification 3221913. This known construction suffers however from a number of in practice most troublesome drawbacks. Thus the construction in question presupposes that the load-carrier consists of a platform body permanently mounted on the frame or chassis of the vehicle. This platform per se has a certain constructional height that intrudes on the allowable total height of the vehicle and thus reduces the maximum possible height of the load-object in question. The fixed platform body also reduces the flexibility of the vehicle in regard of the possibilities of use. Two triangular, upright, guiding plates are arranged on the platform, against each of which a roller on the load object engages for the damping of the load object when this is pulled onto the platform body. These guiding plates constitute a troublesome obstacle at the loading of at least some kinds of goods on the platform body, and if the wish

is to avoid these obstacles a lengthy work is necessary in order to demount and remove the plates. Furthermore two chains are included in the construction that are applied in the extension of two bow-shaped ramps, on one hand intruding in the payload space of the load object, and on the other hand requiring a lengthy work when being demounted from the load object.

#### Short description of the inventive concept

The present invention aims to remove the above-mentioned drawbacks and to create a load-changer that by simple and cheap means permits a convenient and quick change of load-objects of the most different kinds, also including platform bodies per se. These and other aims are, according to the characteristics of the invention, obtained in that said damping means includes at least one arm, swingably mounted on the load carrier, to which arm a spring or piston-cylinder mechanism is connected, that in connection with the loading of the load object on the load-carrier, keeps the arm in a position inclined upwards-forwards from the area of the cog-wheel, wherein the arm can be brought to engage a guide extending along the load object, said mechanism initially counteracting the weight of the load object since the centre of gravity of the load object has passed the cog-wheel and then allowing the arm, and thereby also the load object, to be successively swung down into a plane essentially parallel to the load-carrier.

#### Further elucidation of the state of the art

In the US Patent Specification 3229839 a further load-changer is disclosed that works with a cog-wheel, mounted on the backward end of a platform body and co-operating with an angular cog-track on the load object. However, in order to pull the load object onto the platform body, two rather complicated winches are also necessary which have to be connected to and disconnected from the load object in connection with a loading respectively a discharging of this load object.

## 3.

Short description of the attached drawings

In the drawings Fig 1 is a simplified perspective view showing parts of a vehicle equipped with the load-changer according to the invention, Fig 2 a perspective view of a likewise simplified load object intended to be pulled onto the vehicle according to Fig. 1, Figs 3 and 4 perspective views illustrating two different stages in connection with the pulling of the load object onto the vehicle, Fig. 5 an extremely enlarged perspective view illustrating details in the load-changer according to the invention, and Fig. 6 and 7 perspective views showing an alternative embodiment of the load-changer in two different functional conditions.

Detailed description of an preferred embodiment of the invention

In Fig.1 1 generally denotes a vehicle that in an conventional way includes a wheel-carried frame 2 whereof two lengthwise beams and a backward crossbeam 3 are shown in the drawing. A cross-piece 4 also extends between the lengthwise beams.

The load object according to Fig. 2, in its entirety denoted with 5, is in this case shown to consist of a frame composed by on one hand two lengthwise side beams in the form of U-profiles 6,6', and on the other hand a suitable number of crossbeams 7. It should be noted that the U-profiles 6,6' are open inwards, towards the centre of the frame. In practice this frame can form an integrated part of either a simple platform body or a house of the kind that can be used for camping or recreation purposes. The frame in question can also be a part of other optional load objects that one wishes to pull up onto the vehicle frame 2, if required. On the under side of the frame shown in Fig. 2, more specifically on the under side of the cross-pieces 7, a track 8 provided with cogs or holes is arranged, that, in the example shown, is shown to consist of a box-girder,

4.

onto whose under side a chain has been welded, forming a rigid track extending along the entire length of the frame. At the forward end of this track two hooks 9,9' are fixedly attached for purposes that will be described  
5 below.

Two ears 10,10' are welded onto the backward beam 3 of the vehicle frame 2 carrying a rotatable shaft 11, in the middle of which a cog-wheel 12 is arranged that  
10 in this case can be brought to rotate by means of an electric motor 13 and a gear belonging thereto, more specifically by means of a chain transmission 14. In Fig. 1 a chain 15 is shown to be arranged on the cog-wheel 12 that in an inactive condition can be stored  
15 in a container 16 mounted in the area below the cog-wheel 12.

On the two ears 10,10' furthermore two swingable arms 17,17' are mounted, being mutually connected by  
20 means of a cross-member 18. Between this cross-member 18 and the cross-piece 4 of the frame 2, a spring or piston-cylinder mechanism 19 extends, that at its opposite ends, in a conventional way, is hingedly attached to the cross-member 18 as well as to the cross-piece 4. A backwardly  
25 extending plate 20 is also mounted on the cross-member 18, the function of which is better shown by the description below and with reference to Fig. 5.

On an end link of the chain 15, two pins 21,21' are mounted projecting on both sides of the end link,  
30 each being rigidly attached to an eyelet 22,22' (that in the example shown is in the form of a chain link) in order to allow the automatic coupling of the chain to the hooks 9,9'. Each such eyelet is in turn rigidly  
35 attached to a supporting plate 23,23' that in Fig.5 lies against the plate 20. Three recesses are formed in the backward end of this plate that are mutually separated by means of two fingers 24,24' being inclined upwards-backwards relative to the plate 20.

The function of the load-changer according to the invention

In Fig. 1 and 2 the load object 5 is shown separated from the vehicle 1. More specifically the load object or the frame 5 is imagined to rest on the ground or the floor behind the vehicle. In this position a spring mechanism 19 keeps the two swing arms 17,17' in a state of readiness wherein they are directed obliquely upwards-forwards from the backward end of the vehicle frame 2. When it is desired to lift the frame 5 onto the backward end of the vehicle frame 2, the chain 15 is pulled out of the storage container 16 whereafter the coupling device, formed by the pins 21,21' and the eyelets 22,22', manually is coupled to the hooks 9,9'. In the following stage the motor 13 is started, so that the cog-wheel is brought to rotate. This results in that the forward end of the frame 5 is lifted somewhat upwards by the chain 15 being wound up by the cog-wheel 12. Somewhat before the entire chain has been wound up, the swing arms 17,17', consisting of U-beams, will engage the U-profiles 6,6' of the frame 5 serving as guides, as shown in Fig. 3. After some further rotation of the cog-wheel 12 the hooks 9,9' will automatically be released from their engagement with the eyelets 22,22', which, in the position shown in Fig. 5, are stopped in their forward movement by the plate 20. In this position, the cog- or chain-track 8, that is fixedly attached to the under side of the frame 5, engages the cog-wheel 12, so that the continued pulling of the frame 5 onto the load-carrying frame 2 is taken over by this fixed and rigid chain-track. In this connection, the frame 5 is guided and held in a reliable way by the arms 17,17'. When the frame 5 has been moved so far that the centre of gravity of the frame 5 has passed the cog-wheel 12 (whose centre axis coincides with the swing centre of the arms 17,17'), the spring mechanism 19 will initially counteract the weight of the load object, and then allow the arms 17,17' to be successively swung down, and thereby also the frame 5 itself, into a plane essentially parallel to the load carrying frame 2. In other words, the spring

- mechanism 19 ensures a soft and controlled down-swinging movement of the frame or load object 5; something which is especially important when the load object is very heavy (which is the case of such superstructures as houses).
- 5 After the frame 5 has been fully swung down it is moved forward to its forward end position by a continued rotation of the cog-wheel 12, which co-operates with the chain-track 8 along whole length of the frame 5.
- 10 When the load object is discharged the procedure is carried out in the opposite way. By the co-operation between the cog-wheel 12 and the chain-track 8, the frame 5 is first moved backwards into a position wherein its center of gravity passes the cog-wheel 12, in which position the swing arms 17 are brought to softly swing up, from their horizontal positions into their inclined positions. In connection with the cog-wheel 12 nearing the end of the chain-track 8, the hooks 9,9' engage the eyelets 22,22' of the coupling device whilst moving the chain 15, that is in a state of readiness, so that the chain is brought into engagement with the cog-wheel 12 before the track 8 leaves the cog-wheel. By these means, the load-carrying function of the chain-track 8 is taken over by the chain 15 so that the chain carries the forward end of the frame when the cog-wheel 12 is further rotated. The movement of the chain is continued until the frame 5 again entirely rests against the ground.

#### Short description of an alternative embodiment of the invention

- 30 In this embodiment, the previously described chain-track 8 is replaced by a profile, in its entirety denoted with 25, that includes two sidewardly extending flanges 26,26' between which there is a web in which a number of holes 27 are recessed for engaging the cog-wheel 12'.
- 35 The profile 25 includes two sections 25',25'', extending angularly to each other, of which the first-mentioned is attached to the under side of the load object in question (for instance a house) whilst the other extends vertically



upwards, for instance along a front wall of the load object in question.

On both sides of the cog-wheel 12' two locking fingers 28,28' are arranged, that are sidewardly movable, from and to each other. Each of these fingers includes a sleeve 29,29' rotatably journaled on the shaft 11 and has at their opposite ends, an inwardly projecting rotatable roller 30,30'. Springs 31,31' are arranged between the sleeves 29 and the adjacent ears 10",10"" striving to move the locking fingers towards each other into the position shown in Fig. 6 and against the action of which the locking fingers in a suitable manner (not shown) are separable into the position shown in Fig. 7.

The described device functions in the following way. When the desire is to load the load-object in question, the locking fingers 28,28' are moved sideways, aside from each other, whereupon the vehicle is backed towards the load object so that the cog-wheel 12' engages the holes 27 in the track 25. Then the fingers 28,28' are released, so that the springs 31,31' bring them to move against each other, into the position shown in Fig. 6, wherein the rollers 30,30' engage behind the flanges 26,26'. In this position the locking fingers cause a locking between the vehicle and the load object so that these cannot be separated from each other. Then the motor 13' is started, so that the cog-wheel is brought to rotate; something that results in that the track section 25" will climb upwards relative to the vehicle, whilst lifting the forward end of the load object. After that the cog-wheel 12 has passed the section 25", it automatically engages the horizontal under section 25', meaning that the forward end of the load-carrier, which has now been lifted to the level of the backward end of the load-carrying frame 2, starts to advance inwards over the load-carrying frame. This is continued until the load object in its entirety has been advanced to its forward end position on the load carrying frame.

An obvious advantage of the embodiment according to the Figures 6-7, compared to the embodiment according to Figures 1-5, is that the vehicle can be connected to the load object without there being any need for a manual coupling to the load object. In other words, the vehicle driver can remain sitting in the cabin and there, by mechanical means, control the locking fingers 28, 28' and the motor 13'.

10 Conceivable modifications of the invention

It is evident that the invention is not limited only to the embodiments described above and shown in the drawings. Thus any kinds of cog-formed wheels respectively cog-formed or hole-provided tracks can be used if they only can engage each other in the way described. Further it is possible to use two chains or tracks respectively instead of only one as exemplified above. It is also possible to arrange for a manual rotation of the cog-wheel, although in practice a separate motor is preferred for this purpose. The described mechanism 19 can in practice either consist of a pneumatic and/or mechanical spring or consist of a double-acting hydraulic cylinder by the means of which the downswinging movement of the load object can be controlled as desired. Such a hydraulic cylinder can advantageously be utilized for tilting the frame or load object 5 when discharging the same from the vehicle frame 2 and in connection with such an embodiment the swing arms 17, 17' may be much longer than shown in the drawings, e.g. about half the length of the vehicle frame.

35

CLAIMS

1. Load-changer for vehicles, including a rotatable cog- or toothwheel(12) that is arranged at the edge of a load-carrier(2) and is arranged to engage a track(8,25),  
5 provided with cogs or holes, on the underside of the load object(5) in question, for instance a house, means being provided to dampen the tendency of the load object to swing around the cog-wheel in connection with that the centre of gravity of the load object passes the cog-wheel, c h a r a c t e r i s e d i n that said damping  
10 means includes at least one arm(17,17') swingably mounted on the load-carrier(2) to which arm a spring- or piston-cylinder-mechanism(19) is connected which, in connection with the loading of the load object(5) onto the load  
15 carrier(2), keeps the arm(17,17') in a position inclined upwardly-forwardly from the area of the cog-wheel(12), wherein the arm can be brought to engage a guide(6,6') extending along the load object, said mechanism initially counteracting the weight of the load object since the  
20 centre of gravity of the load object has passed the cog-wheel and then allowing the arm, and thereby also the load object, to be successively swung down into a plane essentially parallel to the load-carrier.

25 2. Load-changer according to claim 1, c h a r a c t e r i s e d i n that the guide is in the form of a U-profile(6,6') which is arranged in the area of the side of the load object and opens inwards towards the centre of the load object, and that the swing arm(17,17')  
30 is in the form of a beam that with a certain fit can be accommodated between the two opposite flanges of the U-profile.

35 3. Load-changer according to claim 1 or 2 including a chain(15) that can be arranged in the elongation of said cog-track(8) to engage the cog-wheel(12) in connection with the lifting of one end of the load object (5) from a position resting against the ground to a

position wherein the cog-track(8) itself can engage the cog-wheel, c h a r a c t e r i s e d i n that in the area under the cog-wheel(12), a container(16) is arranged to receive and/or store the chain(15), the chain being  
5 automatically disconnectable from the load object in connection with that the cog-track(8) engages the cog-wheel(12), as well as being connectable to the load object in connection with that the cog-track disengages the cog-wheel, more specifically by means of at least  
10 one hook(9,9') arranged to co-operate with a coupling device(22,22') arranged on the chain in such a way, that on one hand, the hook releases the coupling device in a position of readiness above the chain container, after the cog-track(8) has engaged the cog-wheel(12) when the  
15 load object is pulled onto the load carrier(2), and on the other hand, the hook engages the coupling device and carries the chain into engagement with the cog-wheel before the cog-track disengages from the cog-wheel when the load object is being discharged from the load-carrier.  
20

4. Load-changer according to claim 3, c h a r a c t e r i s e d i n that the coupling device includes two pins(21,21') projecting on both sides of an end link of the chain(15) that each are rigidly connected to an  
25 eyelet(22,22'), that in turn is rigidly connected to a supporting plate or part(23,23') arranged to, in said position of readiness, lie against a fixedly mounted base part(20) and in that way keep the eyelet in an upright position, wherein an associated hook(9,9')  
30 automatically is guided into and hooked in the eyelet, in order to carry the chain along into engagement with the cog-wheel.

5. Load-changer according to claim 1 or 2, where  
35 the track(25), provided with cogs or holes, includes two sections(25',25'') extending at an angle to each other one section being located on the underside of the load object and the other on a front wall thereof,

c h a r a c t e r i s e d i n that on both sides of the cog-wheel(12') two locking fingers(28,28') are arranged, that are sidewardly movable to and from each other, and that on one hand, in a position close to each other, each engage behind a respective flange(26,26') associated to the track(25) provided with cogs or holes and ensuring a reliable engagement between said track and the cog-wheel, and on the other hand in a position distanced from each other, free the cog-wheel from engagement with said track.

6. Load-changer according to claim 5, c h a r a c t e r i s e d i n that the locking finger includes on one hand a sleeve(29,29') mounted on one and the same shaft(11') that is used for the rotation of the cog-wheel(12'), and on the other hand rotatable roller(30,30') for the engagement behind said flange(26,26').

1/4

Fig 1

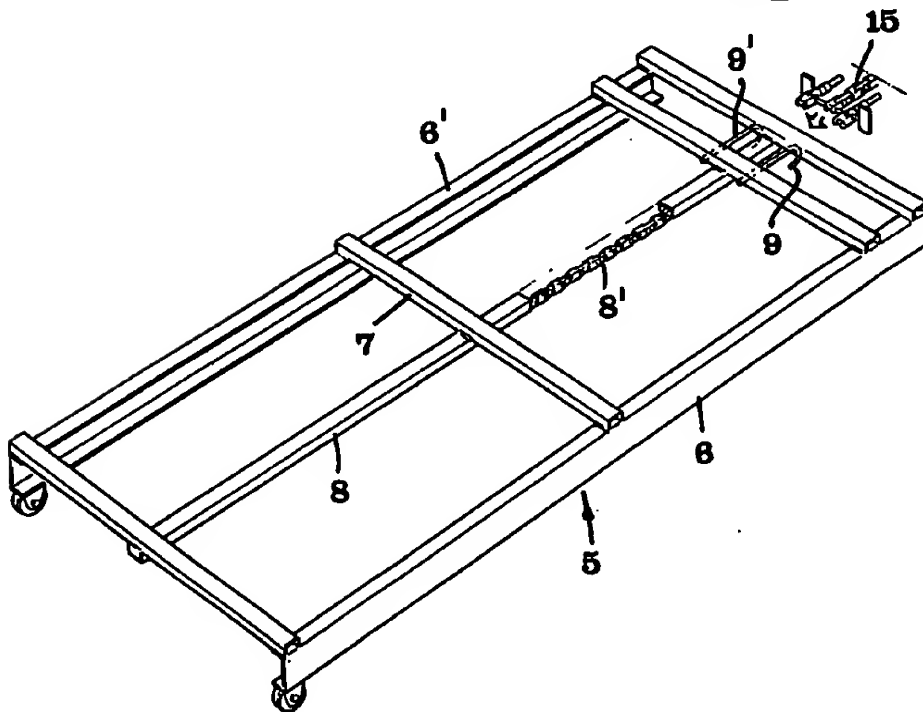
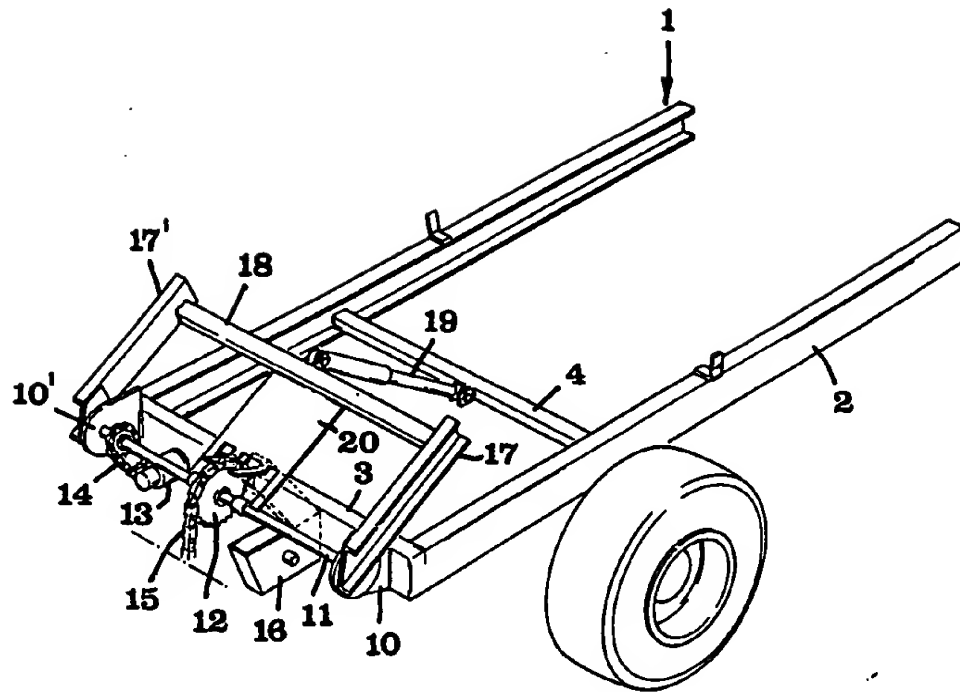
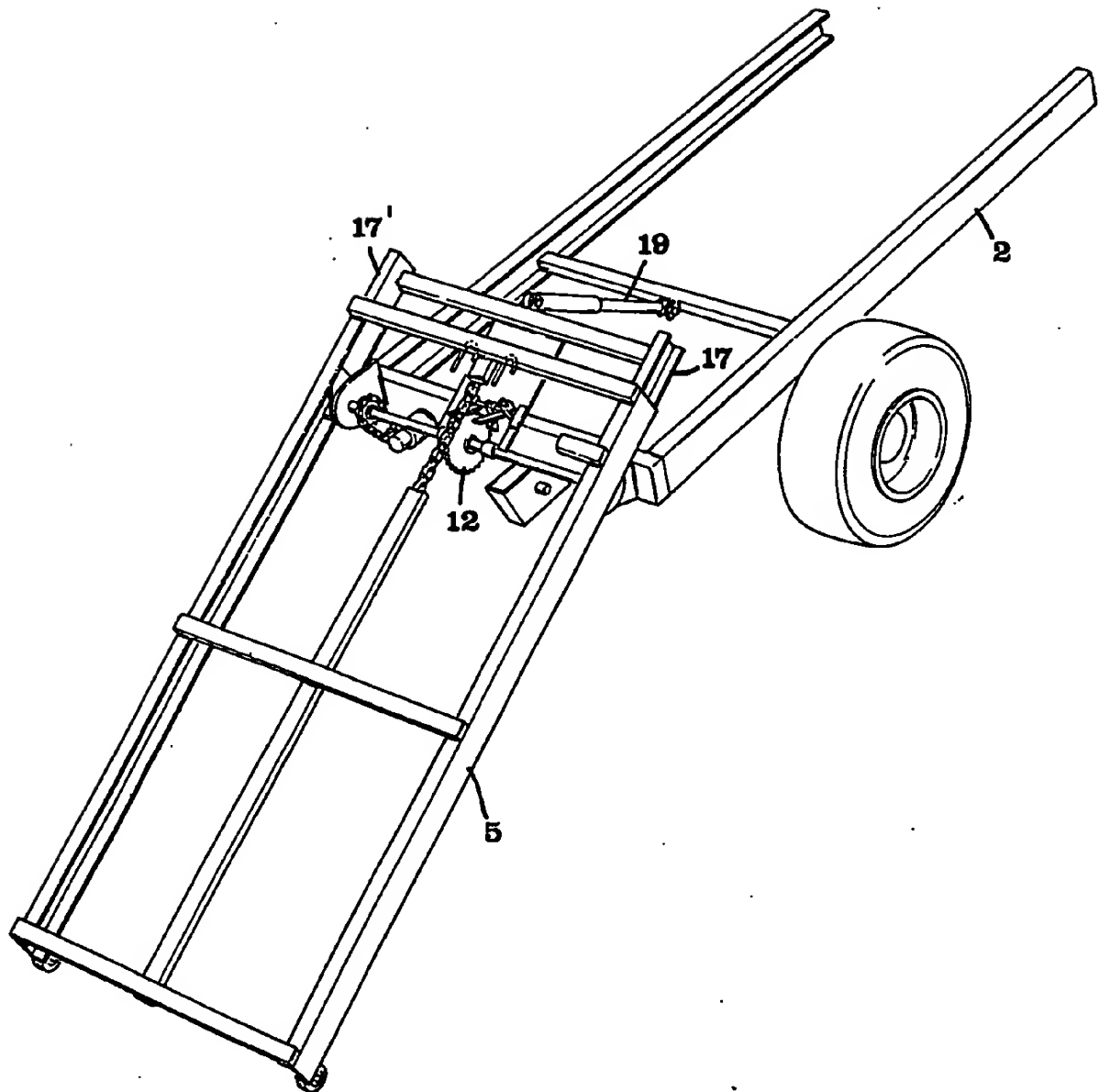
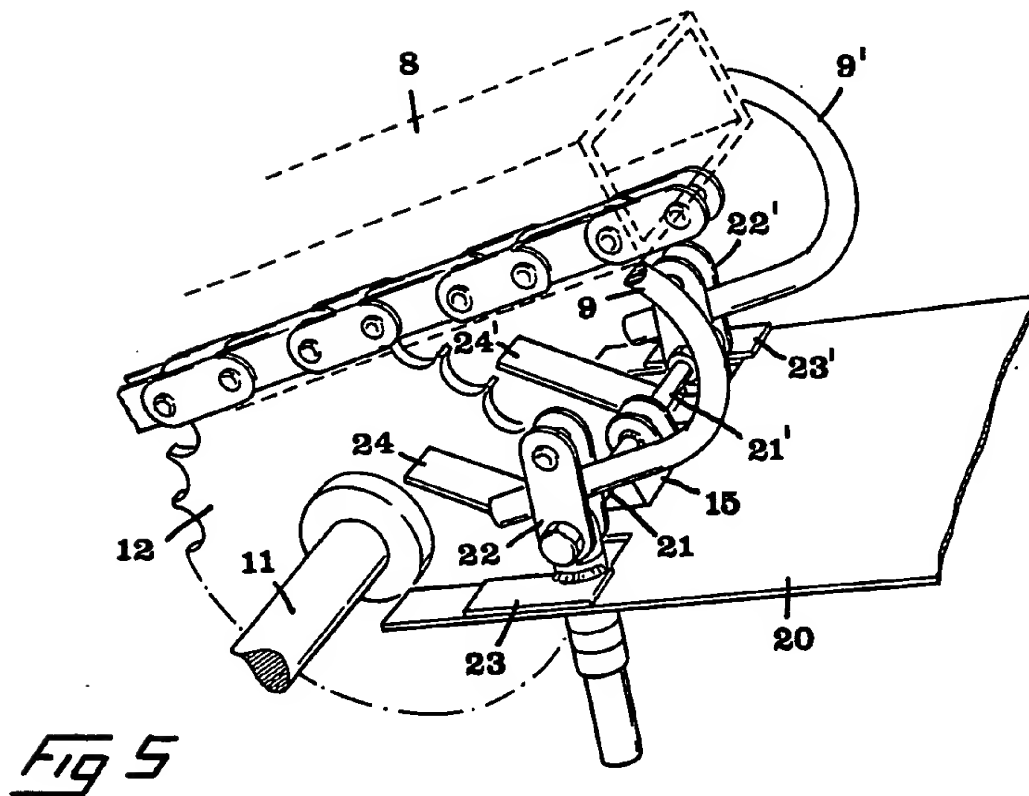
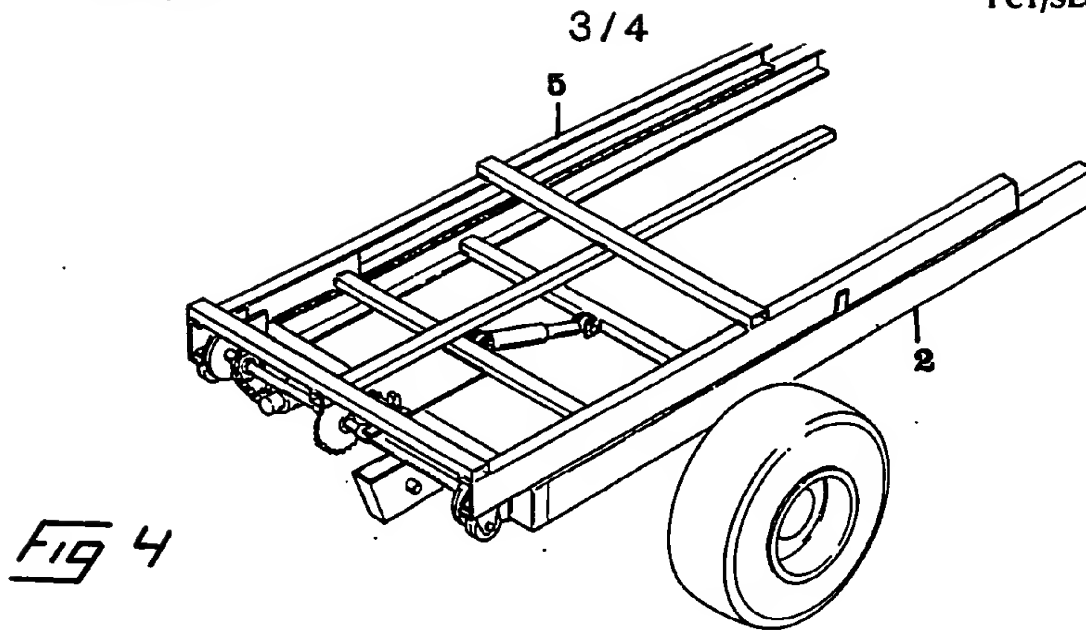


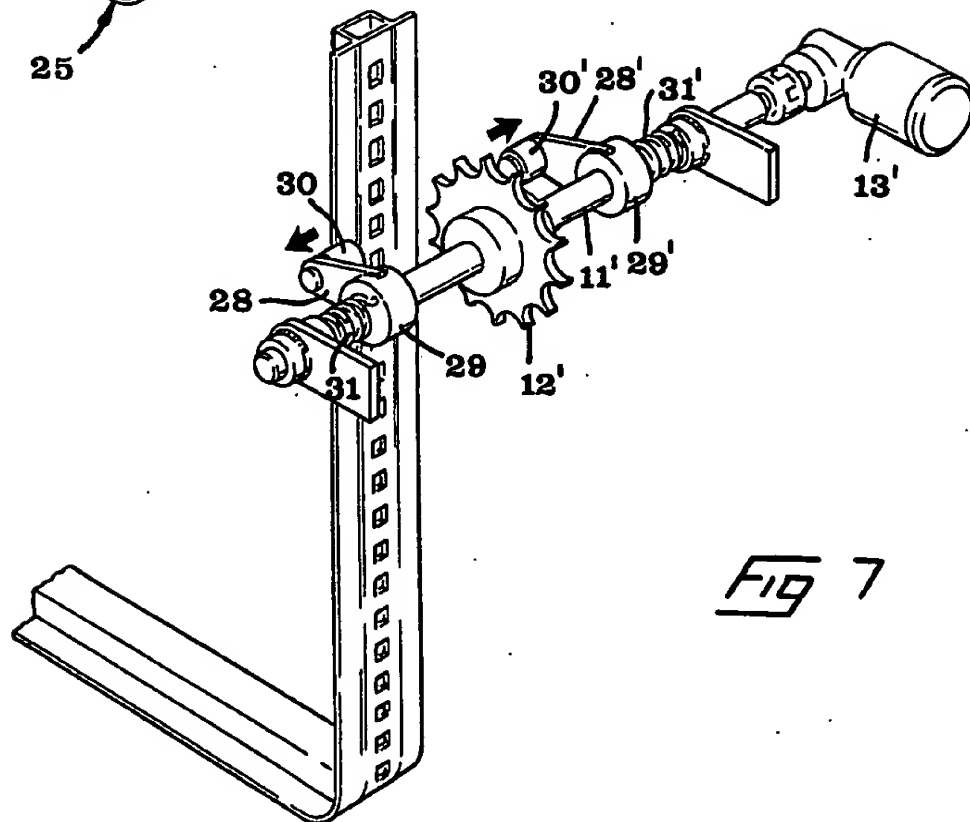
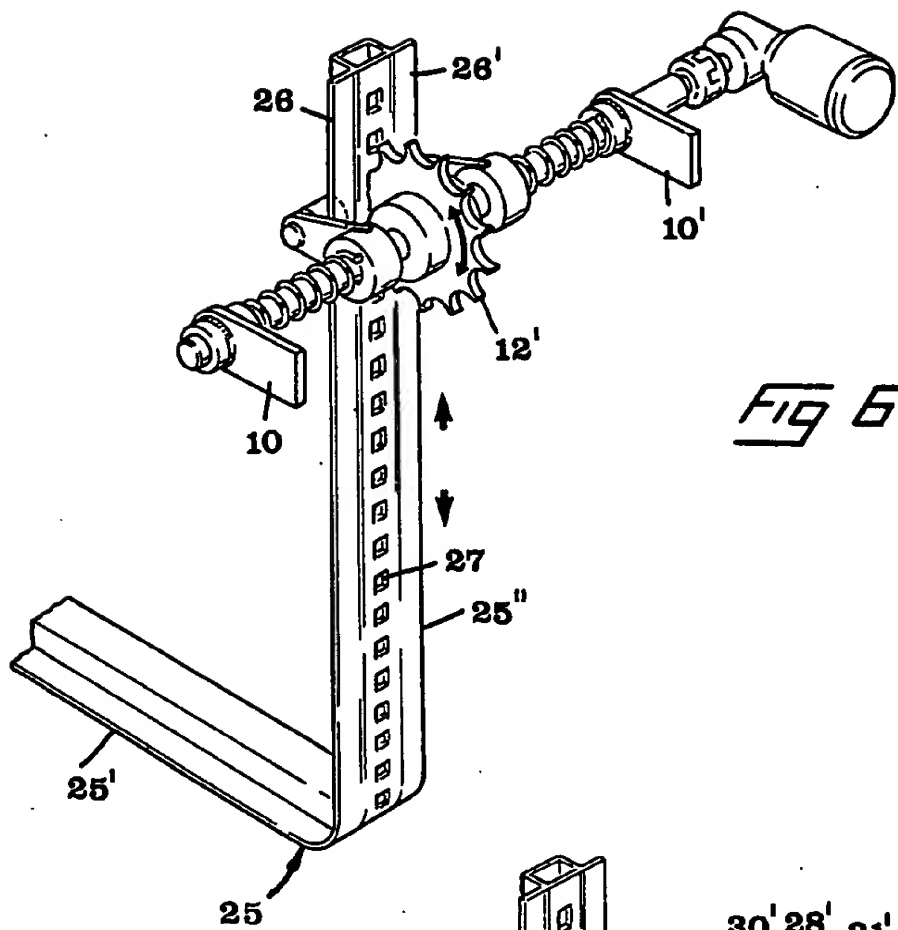
Fig 2

Fig 3





4 / 4



# INTERNATIONAL SEARCH REPORT

PCT/SE86/00221

International Application No.

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC 4		
B 60 P 1/64		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched 7		
Classification System	Classification Symbols	
IPC 2	B 65 J 1/00, /08-/20	
IPC 4	B 60 P 1/00, /02, /44, /46, /64; B 65 G 63/00-/06	
US C1	214:77-80, 500-517; 414:467-559	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *		
SE, NO, DK, FI classes as above		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT *</b>		
Category *	Citation of Document, 11 with indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13
Y	DE, A, 3 226 633 (ALUMINIUM-WALZWERKE SINGEN GMBH) 26 April 1984 & EP, 0101405	1, 5
Y	US, A, 2 588 001 (JAMES C. HOLLAND) 4 March 1952	1
A	US, A, 3 221 913 (LOUIE L. CHAMBERLAIN) 7 December 1965	1
A	US, A, 3 229 839 (REED RASMUSSEN) 18 January 1966	1
A	US, A, 3 819 077 (REED RASMUSSEN ET AL) 25 June 1974	1
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<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
1986-06-27		1986-07-17
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